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Beyond the Cycle: PCOD/PCOS Health Monitoring and Wellness Management System

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Abstract: Polycystic Ovary Syndrome (PCOS) is a complex and multifactorial condition that affects reproductive, metabolic, and overall wellness health. Its management extends beyond menstrual irregularities and involves symptoms, nutrition, physical activity, stress, lifestyle patterns, and environmental factors. With the increasing use of digital healthcare and artificial intelligence, various approaches have been proposed for PCOD/PCOS monitoring, mobile health applications, clinical assessment, and intelligent classification. This review paper presents a comparative analysis of five existing studies covering digital PCOS health tracking, mobile application evaluation, comparative clinical literature, explainable multimodal deep learning, and the evolutionary relationship between PCOS, lifestyle, and environmental factors. The reviewed studies are examined based on their research approach, working methodology, contributions, and limitations. The analysis shows that existing approaches address different aspects of PCOS independently, with digital systems primarily focusing on tracking, mobile applications emphasizing usability and information quality, clinical studies concentrating on disease understanding and management, and artificial intelligence approaches focusing mainly on classification. The review identifies a gap in comprehensive approaches that integrate continuous health monitoring, lifestyle assessment, intelligent analysis, and personalized wellness management. The findings emphasize the importance of moving beyond menstrual-cycle tracking toward a broader and more holistic approach to PCOD/PCOS health and wellness management.

Keywords: PCOS, PCOD, Polycystic Ovary Syndrome, Health Monitoring, Wellness Management, Mobile Health, Artificial Intelligence, Lifestyle Management, Literature Review.

I. INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is one of the most common endocrine and reproductive disorders affecting women of reproductive age. It is characterized by a combination of reproductive, hormonal, and metabolic abnormalities and may be associated with symptoms such as irregular menstrual cycles, hyperandrogenism, weight-related changes, acne, and fertility difficulties. PCOS is not limited to reproductive health, as it can also be associated with metabolic and psychological challenges and may require long-term management. The complex and multifactorial nature of PCOS makes continuous health awareness and appropriate lifestyle management important[1]. Traditionally, PCOS management has largely focused on clinical diagnosis, treatment of symptoms, and periodic medical follow-up. With the growth of digital healthcare, several approaches have been introduced to support menstrual-cycle tracking, symptom recording, lifestyle monitoring, and mobile-based health management. Existing studies have also investigated the quality and usability of PCOS-related mobile applications, while recent artificial intelligence approaches have explored the use of clinical information and medical images for PCOS classification. These developments demonstrate the potential of digital technologies and intelligent methods in supporting PCOS-related healthcare[2]. However, the existing literature indicates that PCOS is influenced by a broader combination of factors, including nutrition, physical activity, stress, metabolic health, genetics, environmental exposure, and lifestyle patterns. Therefore, focusing only on menstrual-cycle tracking or clinical classification may not provide a complete perspective of long-term PCOS wellness management. Research has also highlighted the relationship between modern lifestyle and environmental conditions and the manifestation of PCOS, further emphasizing the importance of considering factors beyond reproductive symptoms[3]. This review paper, titled “Beyond the Cycle: PCOD/PCOS Health Monitoring and Wellness Management System,” examines existing research related to PCOD/PCOS monitoring, mobile health applications, clinical management, artificial intelligence, and lifestyle and environmental factors. The reviewed studies are analyzed according to their research approaches, working methodologies, contributions, and limitations to identify existing gaps in PCOS-related digital healthcare. The objective of this review is to establish a broader understanding of current PCOD/PCOS management approaches and identify the need for more comprehensive and personalized wellness-oriented solutions that extend beyond menstrual-cycle monitoring[4].

II. LITERATURE ANALYSIS

Previous studies have explored PCOD/PCOS management from different perspectives. Kajale et al. (2026) developed a PCOD/PCOS Health Tracker that enables users to record menstrual cycles, symptoms, lifestyle habits, and basic health indicators, although it provides limited advanced prediction and personalized analysis. Arabkermani et al. (2025) evaluated existing PCOS mobile applications using the Mobile App Rating Scale (MARS) and found that while many applications performed well in functionality and aesthetics, limitations remained in user engagement, evidence-based information, and personalization. Disha and Ashok Kumar (2025) presented a comparative review of PCOD and PCOS, discussing their causes, characteristics, diagnosis, treatment approaches, and the importance of lifestyle management, but the study did not propose a digital monitoring platform. Lakshmi and Pushpa (2026) proposed an explainable multimodal deep-learning model using ResNet50, Transformer Encoder, and cross-attention fusion to classify PCOS using ultrasound images and clinical features, achieving improved classification and interpretability; however, the approach primarily targets clinical diagnosis rather than continuous daily wellness monitoring. These studies indicate a research gap for an integrated system that combines menstrual and symptom tracking, lifestyle monitoring, personalized wellness recommendations, trend analysis, and continuous health management, which is addressed by the proposed Beyond the Cycle: PCOD/PCOS Health Monitoring and Wellness Management System.

Table I.
Literature Work

S. No.	Author(s) / Study	Research Work / Approach	Major Contribution	Limitation / Research Gap
1	Bhagyashree Kajale, Rameshwari Kamble, Archita Khedekar, V. A. Bhamre(2026)	PCOD/PCOS Health Tracker for recording menstrual cycles, symptoms, lifestyle habits, and basic health indicators.	Provides a centralized digital approach for PCOD/PCOS health tracking and awareness.	Limited intelligent analysis, prediction, risk assessment, and personalized wellness recommendations.
2	Zahra Arabkermani, Saeed Barzegari, Atefeh Rouhani, Nilofar Nahavandi, Omer Gibreel, Ibrahim Arpacı(2025)	Mobile App Rating Scale (MARS) used to evaluate PCOS mobile applications based on engagement, functionality, aesthetics, and information quality.	Identifies important characteristics and quality requirements of effective PCOS mobile applications.	Evaluates existing applications rather than providing an integrated monitoring and wellness-management solution.
3	N. S. Disha, B. S. Ashok Kumar(2025)	Comparative clinical/literature review of PCOD and PCOS covering causes, symptoms, diagnosis, treatment, lifestyle, nutrition, physical activity, and stress management.	Provides consolidated clinical understanding of PCOD/PCOS and emphasizes lifestyle-based management.	Review-based approach without continuous digital monitoring, automated analysis, or personalized recommendations.
4	V. Lakshmi, B. Pushpa(2026)	Explainable multimodal deep learning using ResNet50, Transformer Encoder, cross-attention fusion, and Grad-CAM++ with ultrasound and clinical data.	Combines imaging and clinical information for PCOS classification while providing explainability.	Requires clinical ultrasound and structured data; primarily focuses on diagnosis/classification rather than everyday wellness monitoring.
5	Jim Parker, Claire O'Brien, Jason Hawrelak, Felice L. Gersh(2021)	Multidisciplinary evolutionary review integrating evidence from genetics, epigenetics, metabolism, reproductive biology, microbiome, environmental factors, diet, and physical activity.	Develops an evolutionary model linking modern lifestyle/environmental conditions with PCOS pathogenesis and highlights lifestyle intervention.	Primarily a conceptual evidence-synthesis model; biological mechanisms remain incompletely established and it does not provide a digital monitoring system.

III. WORKING METHODOLOGY OF REVIEWED STUDIES

1) Bhagyashree Kajale, Rameshwari Kamble, Archita Khedekar, V. A. Bhamre -PCOD/PCOS Health Tracker Working Methodology

The study follows a digital health-monitoring and record-management approach. User-related PCOD/PCOS information, including menstrual-cycle dates, symptoms, lifestyle habits, and basic health indicators, is collected and digitally recorded. The collected information is organized within the health-tracking system, allowing users to maintain their health history and observe changes in menstrual and lifestyle patterns over time. The methodology primarily focuses on converting manual health tracking into a centralized digital process for improving awareness and encouraging healthier habits.

- Methodology Flow:

User Health Data → Menstrual & Symptom Recording → Lifestyle/Health Data Storage → Historical Tracking → Health Awareness

2) Zahra Arabkermani, Saeed Barzegari, Atefeh Rouhani, Nilofar Nahavandi, Omer Gibreel, Ibrahim Arpaci -PCOS Mobile Applications

- Working Methodology:

The study follows an application evaluation methodology using the Mobile App Rating Scale (MARS). PCOS-related mobile applications are identified and evaluated according to several dimensions, including engagement, functionality, aesthetics, information quality, and overall application quality. The researchers assess the available applications against these criteria and analyze their strengths and weaknesses. The methodology helps determine whether existing PCOS applications provide reliable information, useful functionality, good usability, personalization, and sufficient user engagement.

- Methodology Flow:

PCOS Mobile Applications → MARS Evaluation Criteria → Engagement + Functionality + Aesthetics + Information Quality → Comparative Assessment → Identification of Application Strengths & Gaps

3) N. S. Disha, B. S. Ashok Kumar - Comparative PCOD/PCOS Review

- Working Methodology:

The study uses a comparative clinical and literature-review methodology. Existing medical and scientific literature concerning PCOD and PCOS is collected and examined. The information is compared according to major clinical aspects such as causes, symptoms, characteristics, diagnosis, treatment, and management. The review also considers lifestyle-related factors such as nutrition, physical activity, stress management, and lifestyle modification. The findings from the existing literature are synthesized to provide a broader understanding of the similarities, differences, and management requirements of PCOD and PCOS.

- Methodology Flow:

Existing Clinical Literature → Data Collection & Review → PCOD/PCOS Comparison → Analysis of Causes, Symptoms, Diagnosis & Treatment → Lifestyle Management Findings → Consolidated Clinical Understanding

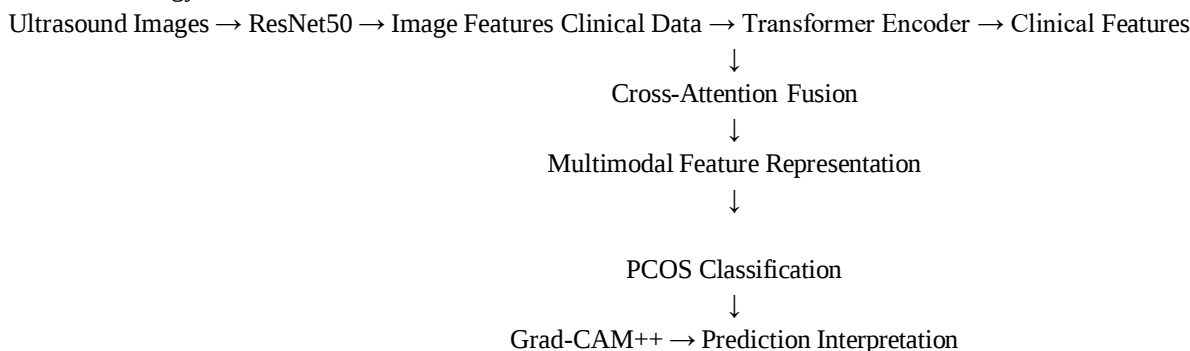
4) Lakshmi, B. Pushpa -Explainable Multimodal Deep Learning

- Working Methodology:

The study follows a multimodal deep-learning methodology that combines ultrasound images with clinical information for PCOS classification.

First, ResNet50 is used to extract meaningful features from ultrasound images. At the same time, clinical information is processed using a Transformer Encoder to learn relevant clinical representations. The features from the two modalities are then combined using a cross-attention fusion mechanism, allowing the model to learn relationships between imaging and clinical information. The fused features are used for PCOS classification. Grad-CAM++ is subsequently used to improve interpretability by highlighting the important regions of the ultrasound image that contribute to the model's prediction.

- Methodology Flow:



5) Jim Parker, Claire O'Brien, Jason Hawrelak, Felice L. Gersh - Polycystic Ovary Syndrome: An Evolutionary Adaptation to Lifestyle and the Environment

- Working Methodology

The study follows a multidisciplinary literature-review and evidence-synthesis methodology. The authors examine evidence from multiple research areas, including evolutionary theory, comparative biology, genetics, epigenetics, metabolism, reproductive biology, microbiome research, and environmental health. Evidence concerning insulin resistance, obesity and lean PCOS phenotypes, reproductive effects, in-utero developmental programming, transgenerational inheritance, microbiome dysbiosis, endocrine-disrupting chemicals, diet, and physical inactivity is reviewed. These different lines of evidence are then synthesized to develop a composite evolutionary model of PCOS pathogenesis. The model explains PCOS as potentially resulting from an interaction between inherited biological mechanisms and modern lifestyle and environmental conditions.

- Methodology Flow

Existing Research Evidence → Evolutionary + Genetic + Epigenetic + Metabolic + Environmental Evidence → Comparative Analysis → Evidence Synthesis → Evolutionary Model of PCOS Pathogenesis → Lifestyle & Environmental Implications

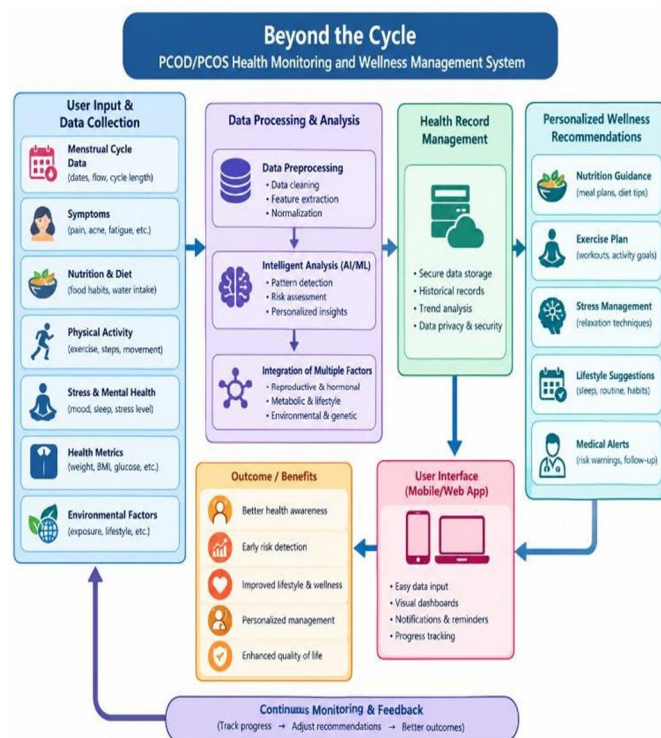


Fig 1. System Diagram

IV. RESULTS AND DISCUSSION

The literature review indicates that PCOD/PCOS research has developed across several important areas, including digital health tracking, mobile health applications, clinical management, artificial intelligence, and lifestyle-based research. The five reviewed studies demonstrate that PCOS is a complex condition requiring consideration of menstrual, metabolic, reproductive, behavioral, and environmental factors.

The first study demonstrates the usefulness of digital health tracking for recording menstrual cycles, symptoms, lifestyle habits, and basic health information. This approach improves accessibility and health awareness; however, its functionality is mainly limited to recording and monitoring information. The findings indicate a need for more intelligent analysis and personalized recommendations. The second study, which evaluates PCOS mobile applications using the Mobile App Rating Scale (MARS), shows that application quality depends not only on functionality but also on engagement, aesthetics, information quality, and usability. This highlights the importance of designing health applications that are both informative and user-friendly. However, application evaluation alone does not provide continuous intelligent health assessment.

The comparative review by Disha and Ashok Kumar emphasizes that PCOD/PCOS management extends beyond menstrual irregularities. Nutrition, physical activity, stress management, lifestyle modification, and regular follow-up are important components of long-term management. This finding supports the need for a broader wellness perspective rather than focusing only on menstrual-cycle tracking.

The multimodal deep-learning study by Lakshmi and Pushpa demonstrates the potential of artificial intelligence for PCOS classification. By combining ultrasound images with clinical information, the approach can utilize multiple sources of medical information, while Grad-CAM++ improves interpretability. However, such an approach is more appropriate for clinical classification and requires specialized medical data, making it less suitable for routine everyday wellness monitoring.

The review by Parker et al. further expands the understanding of PCOS by connecting the condition with genetic, epigenetic, metabolic, environmental, microbiome, nutritional, and lifestyle factors. Their evolutionary model suggests that interactions between inherited mechanisms and modern environmental and lifestyle conditions may contribute to PCOS development. This reinforces the importance of considering lifestyle and environmental factors alongside reproductive symptoms.

A. Comparative Discussion

Overall, the reviewed literature reveals that existing research addresses different components of PCOS independently. Digital systems focus primarily on tracking, application studies focus on usability and quality, clinical reviews focus on disease understanding and management, deep-learning approaches focus on classification, and evolutionary research focuses on lifestyle and environmental influences.

V. CONCLUSION

Research Area	Finding from Literature	Identified Gap
Menstrual & symptom tracking	Digital tracking can improve health-record management.	Limited intelligent interpretation and prediction.
Mobile health applications	Engagement, usability, functionality, and information quality are important.	Limited integration of comprehensive personalized wellness management.
Clinical management	Nutrition, exercise, stress management, and lifestyle modification are important.	Limited continuous digital monitoring of these factors.
Artificial intelligence	Multimodal AI can support PCOS classification.	Requires clinical datasets and is not designed primarily for everyday wellness monitoring.
Lifestyle & environment	Lifestyle, metabolic, genetic, and environmental factors may influence PCOS.	These factors are rarely integrated into one continuous digital management framework.

VI. DISCUSSION

The major finding of this review is that PCOS management should extend beyond menstrual-cycle monitoring. The literature demonstrates the importance of combining reproductive health information with symptoms, lifestyle, nutrition, physical activity, stress, and other wellness-related factors. At the same time, AI-based approaches demonstrate the potential for intelligent analysis, while mobile health research emphasizes the importance of usability and engagement.

Therefore, the literature identifies a clear research gap for a comprehensive PCOD/PCOS wellness-management approach that can bring together monitoring, lifestyle assessment, intelligent analysis, and personalized guidance. This gap forms the basis for the proposed “Beyond the Cycle: PCOD/PCOS Health Monitoring and Wellness Management System.”

The literature review demonstrates that Polycystic Ovary Syndrome (PCOS) is a complex condition influenced by multiple reproductive, metabolic, lifestyle, genetic, and environmental factors. The reviewed studies show that existing research has explored different aspects of PCOS, including digital health tracking, mobile application evaluation, clinical management, artificial intelligence-based classification, and lifestyle and environmental influences.

The review also indicates that existing approaches generally focus on individual aspects of PCOS management. Digital trackers mainly record menstrual and symptom information, while AI-based approaches concentrate on clinical classification. Other studies emphasize application usability or lifestyle and environmental factors. However, there remains a gap in integrating these aspects into a single, continuous, and personalized wellness-management framework.

Therefore, the findings support the need for a system that goes “Beyond the Cycle” by considering not only menstrual patterns but also symptoms, lifestyle, nutrition, physical activity, stress, and other relevant wellness indicators. An integrated approach can support better self-monitoring, health awareness, and personalized wellness management while complementing professional medical care. The identified research gap provides the foundation for developing the proposed PCOD/PCOS Health Monitoring and Wellness Management System.

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